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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/798,479	03/12/2004	Toshihide Izumiya	250397US2TTC	6259

22850 7590 04/18/2005

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EXAMINER	
LOUIE, WAI SING	

ART UNIT	PAPER NUMBER
2814	

DATE MAILED: 04/18/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/798,479	IZUMIYA, TOSHIHIDE	
	Examiner	Art Unit	
	Wai-Sing Louie	2814	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-18* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-18* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *3/12/04*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

Claims 3 and 13-18 are objected as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

- In claims 3 and 13-18, it is unclear what is first and second semiconductor. For the purpose of examination, "first and second semiconductor reflection films", is assumed.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-n are rejected under 35 U.S.C. 103(a) as being unpatentable over Wasserbauer et al. (US 6,720,585) in view of Kish et al. (US 5,724,376) and Williamson et al. (US 6,262,465).

With regard to claim 1, Wasserbauer et al. disclose a long wavelength vertical-cavity surface-emitting laser, VCSEL, (col. 2, line 62 to col. 9, line 55 and fig. 1) comprising:

- A first reflection film 14 to reflect light with a wavelength (col. 3, lines 53-58 and fig. 1);

- A light-emitting layer 16 formed on the first reflection film 14, the light-emitting layer being injected with electric current to emit light with a wavelength of about 850 nm (col. 5, lines 21-25 and fig. 1);
- A second reflection film formed on the light-emitting layer 16 to reflect the light with the wavelength 850 nm (fig. 1), the second reflection film being provided with a periodical structure (24 mirror periods) alternately stacked with a first semiconductor layer and a second semiconductor layer (col. 3, lines 32-37), where a reflectivity with respect to the light with the wavelength of the second reflection film is lower than the periodical structure (30 mirror periods) of the first reflection film (col. 7, lines 36-42);
- A high resistance region 20 and 22 formed in a part of the second reflection film 18 (fig. 1);
- Wasserbauer et al. do not disclose an electric current spreading layer formed on the second reflection film to transmit the light. However, Kish et al. disclose a TS layer 57, which acts as a current spreading layer (Kish col. 4, lines 36-48 and fig. 4). Kish et al. teach the TS layer lowers the resistance and imp roofs the current spreading in the structure (Kish col. 5, lines 6-20). Wasserbauer et al. and Kish et al. have substantially the same environment of laser diode having the DBR structure. Therefore, it would have been obvious for the one with ordinary skill in the art to modify Wasserbauer's device with the teaching of Kish et al. to provide a current spreading layer in order to reduce the resistance and improve the current spreading to the active region of the device;

- Wasserbauer et al. do not disclose a contact layer formed on the electrical current spreading layer. However, Williamson et al. disclose a contact layer on the device (Williamson col. 3, lines 57-62 and fig. 2). Williamson et al. teach this layer provide low series resistance of the device (col. 4, lines 1-5). Wasserbauer et al. and Williamson et al. have substantially the same environment of VCSEL. Therefore, it would have been obvious at the time the invention was made to modify Wasserbauer's device with the teaching of Williamson et al. to provide a contact layer in order to reduce the resistance of the device.

With regard to claim 2, Wasserbauer et al. do not disclose the light-emitting semiconductor device is capable of operating at a speed of not less than 500 Mbps. However, the operating speed is considered to involve routine optimization, which has been held to be within the level of ordinary skill in the art. As noted in In re Aller, the selection of reaction parameters such as [temperature and concentration, thickness] etc. would have been obvious:

> "Normally, it is to be expected that a change in temperature, or in thickness, or in time, would be an unpatentable modification. Under some circumstances, however, changes such as these may impart patentability to a process if the particular ranges claimed produce a new and unexpected result which is different in kind and not merely degree from the results of the prior art...such ranges are termed "critical ranges and the applicant has the burden of proving such criticality.... More particularly, where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation."
>
> *In re Aller 105 USPQ233, 255 (CCPA 1955). See also In re Waite 77 USPQ 586 (CCPA 1948); In re Scherl 70 USPQ 204 (CCPA 1946); In re Irmscher 66 USPQ 314 (CCPA 1945); In re Norman 66 USPQ 308 (CCPA 1945); In re Swenson 56 USPQ 372 (CCPA 1942); In re Sola 25 USPQ 433 (CCPA 1935); In re Dreyfus 24 USPQ 52 (CCPA 1934).*

Therefore, one of ordinary skill in the requisite art at the time the invention was made would have used any operating speed suitable to the method of the process in order to optimize the design.

With regard to claims 3-4, Wasserbauer et al. disclose the first and second semiconductor reflection films 14 and 18 are made of Group III-V compound semiconductor, where Group V element is common (col. 5, lines 21-52 and Table 1).

With regard to claims 5-8, Wasserbauer et al. disclose the first semiconductor reflection film 14 is made of $Al_jGa_{1-j}As$ and second semiconductor reflection film 18 is made of $Al_kGa_{1-k}As$, where $j<k\leq 1$ (col. 5, lines 21-52 and table 1). Wasserbauer et al. modified by Kish et al. do not disclose the current spreading layer is made of AlGaAs. However, Kish et al. disclose the light-emitting structure is AlGaAs (Kish Table 1) and teach the TS wafer 57 should be lattice matched with the light-emitting structure (Table 1). Therefore, it would have been obvious the current spreading layer could be AlGaAs.

With regard to claims 9-12, Wasserbauer et al. disclose the aluminum composition is 0.25 in reflection film, but do not disclose the aluminum composition is not less than 0.4 in the reflection film and is not less than 0.2 in the current spreading layer. Since the applicant has not established the criticality of mole fraction stated and since these mole fractions are in common use in similar devices in the art, it would have been obvious to one of ordinary skill in the art to use these values in the device. Where patentability is said to be based upon particular chosen dimension or upon another variable recited in a claim, the applicant must show that the chosen dimensions are critical. In re Woodruff, 919 F2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

With regard to claims 13-18, Wasserbauer et al. disclose the first reflection film has 30 stacked pairs of periodical structure and the second reflection film has 24 stacked pairs of periodical structure (col. 7, lines 36-42), but do not disclose the stacked pairs of the first and second semiconductor reflection films ranges 4 to 12. Since the applicant has not established the criticality of mole fraction stated and since these mole fractions are in common use in similar devices in the art, it would have been obvious to one of ordinary skill in the art to use these values in the device. Where patentability is said to be based upon particular chosen dimension or upon another variable recited in a claim, the applicant must show that the chosen dimensions are critical. In re Woodruff, 919 F2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Wai-Sing Louie whose telephone number is (571) 272-1709. The examiner can normally be reached on 7:30 AM to 4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on (571) 272-1705. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Wsl
April 12, 2005.